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For: METHOD AND SYSTEM OF CONTROLLING REPLACEMENT OF TERMINAL
EQUIPMENT IN A BUILDING MANAGEMENT SYSTEM

Enclosed are:

- ☒ 15 sheets of drawings.(Figs. 1-16,17A,17B,18)
- ☒ Specification, including claims and abstract (27 pages)
- ☒ Declaration
- ☒ An assignment of the Invention to FUJITSU LIMITED
- ☒ A certified copy of Japanese Application No. 11-010414
- ☒ An associate power of attorney
- ☐ A verified statement to establish small entity status under 37 CFR 1.9 and 37 CFR 1.27
- ☒ Post card
- ☒ Recording fee (as indicated below)
- ☒ Information Disclosure Statement, PTO-1449, copies of 2 references
- ☐ Other _____
- ☐ Other _____

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TOTAL CLAIMS	12-20 =	0
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METHOD AND SYSTEM OF CONTROLLING REPLACEMENT OF TERMINAL
EQUIPMENT IN A BUILDING MANAGEMENT SYSTEM

BACKGROUND OF THE INVENTION

5

Field of the Invention

The present invention relates to a method for controlling
replacement of terminal equipment in a building management
system.

10

Description of the Related Art

A building management system is used to monitor installed
apparatuses localized in a building. There are cases where a
few hundred to hundreds of thousand points to be monitored
according to a scale of the building. For example, statuses
and alarms of the installed apparatuses, analog measured values,
such as temperature or humidity, and current values, and an
integrated value of electric power meters are monitored.

15

20

Such the information as exemplified above is connected to
terminal equipment of the building management system through
a relay connection (PIO) input and output, an analog input
interface or a pulse input interface of a power board or a
control board, which are locally provided.

25

In addition, the building management system is generally
replaced after the elapse of 10 to 15 years from first installed.

Therefore, at the replacement of the system, the old system should be reflected with a new system, of which structure is quite different from the old system because remarkable progressed technology has been developed up to the replacement.

5 In addition, structures of terminal equipment or a transmission method between a center device and each terminal equipment are also quite different from those of the old system in the building management system.

10 When a plurality of terminal equipment are replaced in the building management system, the replacement requires switching a few hundreds or hundreds of thousand external input and output points, which are connected to the plurality of terminal equipment while continuing the operation. Therefore, the system switching takes a long period from several weeks to
15 several months.

From such the situation, it is required that the building management system should be replaced smoothly within a relatively shorter switching period, while the operations continue, without any trouble.

20 When a plurality of terminal equipment are replaced in the conventional building management system, the following methods and modes are used:

First method is that all of the center device and a plurality of terminal equipment, in the building management system, are
25 simultaneously replaced, and

Second method is that the center device and a plurality of terminal equipment are separately replaced.

In the second replacing method, only the center device is replaced to new one at first stage to connect the plural existing terminal equipment, and the plural existing terminal equipment are replaced to new equipment at the second stage.

5 In either of these replacing methods, it is the principle that the old building management system is switched to new one while the operation is continued. Then, the switching from old terminal equipment to new equipment takes a period from several weeks to several months, and the following switching modes are
10 used for each method.

For the first method (Simultaneous replacing system);

As shown in Fig. 12, an existing system 10, which is still in a normal operation status, and a new system 20 is built up with a new center device 100A having a human-machine interface
15 202 and a processor 200, while executes application programs, such as a remote schedule program. The existing system 10, then, starts up the new system and confirms the operation thereof.

All of plural terminal equipment 201 belonging to the new system 20 are provided at the same time of providing the center
20 device 100A of the new system 20 in advance. Alternatively, all external inputs and outputs of the existing terminal equipment 101 are switched to those of the new terminal equipment 201 while the existing terminal equipment 101 is serially switched and is replaced to the new terminal equipment
25 201.

When all of the new terminal equipment 201 are just switched, the existing system 10 is removed.

For the second method (Separate replacing system);

First stage: Replacing a center device

As shown in Fig. 13, a new center device 100A, which has a processor 200 and a human-machine interface 202, is installed.

5 After the operation is confirmed, a destination of connecting a line of the existing terminal equipment 101 is switched from the center device 100 of the existing system 10 to the center device 100A of the new system 20. After the switching, the existing center device 100 of the existing system 10 is removed.

10 Second stage: Replacing the terminal equipment

While the operation is executed in the center device of the new system 20, the existing terminal equipment 101 is replaced to the new terminal equipment 201.

15 In addition, in Fig. 13, the processor 200 is connected to the existing terminal equipment 101 through an interface 203.

As a first mode, as shown in Fig. 14, a temporal center device 100B is temporally provided for switching terminal equipment so as to connect the new terminal equipment. The
20 existing terminal equipment 101 is subsequently switched to the new terminal equipment 201.

As a second mode, a processor 200A and an interface circuit 203A are provided in the new center device 100A of the new system 20, as shown in Fig. 15, data for new terminal equipment are
25 installed in addition, and the existing terminal equipment 101 are subsequently switched to new terminal equipment 201.

As is apparent from the above-described explanation of Fig.

14, it is required to prepare two systems having the same scale at the same time, in the case of the separate replacing method of Fig. 14. However, the separate replacing system shown in Fig. 15 is preferable because there is no requirement to provide
5 two same systems at the same time.

In an example shown in Fig. 14, although there is no need to perform duplicate data registration, the following problem will occur. In other words, two sets of center devices 100 and 100B should be prepared.

10 Further, the user should operate the two center devices 100 and 100A during the switching period according to the switching status, thus a problem occurs obstacle in using the both system.

On the other hand, although there is no need to prepare two center devices in the example shown in Fig. 15, duplicate
15 data should be registered for both the existing terminal equipment 101 and the new terminal equipment 201.

In this case, points to be monitored and controlled or management points, which are input and output to the terminal equipment, are managed by addresses called as hard addresses,
20 and these hard addresses must be different each for the existing terminal equipment and the new terminal equipment.

Therefore, it is required that point data must be prepared, of which attribute data, such as the name or type of the management point, is the same but only the addresses are
25 different.

Further, since the point addresses are registered for display data or each functional data, duplicate data are

prepared for the existing terminal equipments 101 and the new terminal equipment 201 in advance or the data registration should be changed according to the switching. Thus, the following problems occur:

5 One of the problems is that the data, such as point addresses or display data, should be registered in double, thus the capacity of memory requires double of the number of the points to be managed. Additionally, the data to be set, such as functional data, should be changed according to the switching
10 of the terminal equipment, thus it takes much time to switch the system.

 In addition, the double registered data should be properly used depending on the operation according to the switching status of the terminal equipment, thus the operation management
15 is hindered during the switching period.

SUMMARY OF THE INVENTION

 Accordingly, to overcome the above-described conventional
20 problems, it is an object of the present invention to provide a method of controlling a replacement of terminal equipment in a building management system, in which a system can be effectively replaced, without providing any temporal apparatuses and without any obstacle on the operation.

25 In addition, it is another object of the present invention to provide a method of controlling a replacement of terminal equipment, by which the system can be effectively replaced,

without preparing duplicated data for existing terminal and new terminal equipments, can effectively replace the system, without preparing duplicated data for existing terminal and new terminal equipments.

5 It is further object of the present invention to provide a method of controlling a replacement of terminal equipment in a building management system, in which operations can be accurately performed as the same as the previously used system without any obstacle on the operation because management point
10 addresses are not changed.

 The above-described objects can be achieved by method and system of controlling a replacement of terminal equipment in the building management system according to the present invention, connected to plural points to be managed in a
15 building, including the step of tabulating a connecting status showing which existing terminal equipment or new terminal equipment is used in each point to be managed and correspondence between a hard address of the existing terminal equipment and the new terminal equipment.

20 The hard address corresponding to the points to be managed from the tabled connecting status of the terminal equipment and the correspondence between the hard addresses of the existing terminal equipment and the new terminal equipment.

 In one preferred mode, the step of tabulating includes the
25 steps of: tabulating connecting status of the terminal equipment to be managed in each terminal equipment, specifying which existing or new terminal equipment is used in each

terminal equipment, and generating connecting status of the terminal equipment in each point to be managed according to the specification.

In the other mode of the present invention, the connecting status of the terminal equipment is expressed by a flag to be set when the connecting status is tabulated. Further, in other preferred mode, in the step of switching the hard addresses when the existing terminal equipment is switched to the new terminal equipment according to a judgement of the connecting status of the terminal equipment when switching the hard address corresponding to the points to be managed, the point to be managed is only monitored and controlled, of which mode is changed to a TEST mode where the point can not be monitored and controlled by application processes. Furthermore, in the other preferred mode, the TEST mode is transited to a normal operation mode by a manual operation.

Further, other objects of the present invention will become clear by the description for explaining embodiments according to the attached drawings.

BRIEF DESCRIPTION OF THE PRESENT INVENTION

Fig. 1 is a diagram for explaining system and hardware structures to realize a method of controlling a replacement of terminal equipments in the building management system according to the present invention.

Fig. 2 is an explanatory diagram of a first embodiment of

the present invention.

Fig. 3 is a diagram of explaining one example of processes by the use of a processor according to the present invention when the status is changed.

5 Fig. 4 is an operational flow chart of the processor of the process explanatory diagram shown in Fig. 3.

Fig. 5 shows a second embodiment according to the present invention.

10 Fig. 6 is an operational flow chart corresponding to Fig. 5.

Fig. 7 shows a third embodiment according to the present invention.

Fig. 8 shows a relationship between HMI and the processor to explain the third embodiment.

15 Fig. 9 is one example showing a state diagram of the existing and new terminal equipments.

Fig. 10 is an operational flow chart corresponding to Fig. 9.

20 Fig. 11 is a diagram showing a fourth embodiment according to the present invention, which is a system structural diagram to improve the operation of the above-described embodiments by an address converter 213.

Fig. 12 is an explanatory diagram of the conventional first method.

25 Fig. 13 is an explanatory diagram of the conventional second method.

Fig. 14 shows the other mode of the conventional second

method.

Fig. 15 further shows the other mode of the conventional second method.

Fig. 16 shows an embodiment of the building management system by the use of the conventional technique in contrast to the diagram of Fig. 1.

Figs. 17A and 17B are explanatory diagrams of a detailed example of Fig. 16.

Fig. 18 is an operational flow chart of a processor (PS) 200 (200A) corresponding to the operational explanatory diagram shown in Fig. 17B.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Hereinafter, embodiments of the present invention will be now described in reference to the drawings. Throughout the attached drawings, the same reference numerals and symbols are used to denote and identify corresponding or identical components.

Fig. 1 is an explanatory diagram of system and hardware structures to realize a method of controlling a replacement of terminal equipment in a building management system according to the present invention.

In Fig. 1, a center device 100 has a human-machine interface (HMI) 202, connected to a LAN, graphically displays statuses of the apparatuses to be monitored, on a CRT display device 204, and controls with an operator and a human-machine

interface.

A keyboard 205 and a mouse 206 for operating the HMI 202 are connected to the HMI 202. These devices are used to collect information of the terminal equipment 101 from a processor 200 and execute each function by using the information.

A printer 207 is further connected to the LAN that prints a continuous formed table where a message showing the statuses of the apparatuses to be monitored are changed and a measured value are tabulated in a dairy form or a hard copy of the screen displayed on the CRT display device 204 of the HMI 202.

The terminal equipment 101 has plural remote stations (RS) 120, takes an interface with apparatuses to be monitored to connect them, and inputs from and outputs the information to the apparatuses. Further, the terminal equipment 101 transmits to and receives the information from an upper level processor (PS) 200.

In here, the practical situation of the conventional method of controlling will be further explained for better understanding of the present invention. Fig. 16 shows an example of the conventional building management system, in contrast to Fig. 1.

When the plural terminal equipment are replaced in the structure of Fig. 16, the processors (PS) 200 and 200A for the existing and new terminal equipment 101 and 101A are serially driven as described above.

An input or output line from an installed apparatus 101B connected to the terminal equipment 101 is re-wired from the

existing terminal equipment 101 to the new terminal equipment 101A to switch the system.

In this case, the processors (PS) 200, 200A and the human-machine interface (HMI) 202 recognize a connecting point of the existing terminal equipment 101 and a connecting point of the new terminal equipment 101A with respective different addresses.

In other words, in the above-described example, the installed apparatus ① 101B takes a different address between the case where the installed apparatus 101B is connected to the existing terminal equipment 101 and the case where the installed apparatus 101B is connected to the new terminal equipment 101A, as shown in Fig. 17A.

In Fig. 17A, NA means a processor number, LA means an interface number, RA means a terminal equipment number, and PA means a destination number in the terminal equipment. When connecting to the existing terminal equipment 101, the address of the installed apparatus ① 101B becomes "0101020101", because NA is "01", LA is "01", RA is "02" and PA is "0101", for example.

On the other hand, the address of the installed apparatus ① 101B is changed to "0201020101" when connecting to the new terminal equipment 101A, because only NA is changed to 02.

Therefore, when the installed apparatus ① 101B is displayed on the screen of the CRT display device 204 of the HMI 202, for example, it is required to prepare two screens for the existing and new terminal equipments 101 and 101A.

Fig. 17B shows an example where the status change, of the installed apparatus 101B linked to the terminal equipments 101 and 101A, obtained from the processor (PS) 200 is displayed on two of the different screens 204 and 204A by the HMI 202.

5 Fig. 18 is an operational flow chart of the processor (PS) 200 (200A) corresponding to the operational explanatory diagram shown in Fig. 17B. The processors 200 and 200A collect terminal information from the terminal equipment 101 and 101A (STEP S001). The processors 200 and 200A scan a point information database
10 210 (STEP S002), and inform the present situation to the HMI 202, which is an upper level device, that the status of the installed apparatus having the detected point address is changed (STEP S003).

In addition, the HMI 202 informs the information that the
15 status is changed received from the processors 200 and 200A, as shown in Fig. 17B (STEP S004), and reads out the data of the point information from the point information database 211 (STEP S005). Different information for the same installed apparatus is registered as the point information.

20 Next, the screen displaying process is performed (STEP S006), and the information is displayed on the two screens 204 and 204A respectively for the existing and new terminal equipment.

Although controlling and monitoring functions, such as a
25 schedule starting or stopping control function, are realized in the HMI 202 and the processor 200 of the building management system, the points to be managed are registered according to

the address. Therefore, in the conventional system of Fig. 16, it is required to register two process data or to change the registered addresses for the same installed apparatus, similarly to the case of the displayed screen.

5 On the contrary, the method according to the present invention can prevent from generating the above-described problems. Fig. 2 is an explanatory diagram of the first embodiment according to the present invention where a HMI address correspondence table TI, a hard address correspondence table TII of the existing terminal equipment, and a hard address
10 correspondence table TIII of the new terminal equipment are included, each of which are maintained in the HMI 202.

The correspondence table TI indicates the hard address (H. ADR (OLD)) of the existing terminal equipment corresponding
15 to each address (P. ADR) of the management point, the hard address (H. ADR (NEW)) of the new terminal equipment, and the connection status (STATUS) of the terminal equipment that shows which existing or new terminal equipment is used.

The hard addresses are automatically selected according
20 to the status of connection from correspondence in the table TI, and the selected hard addresses are expanded on the processor (PS) address correspondence tables TII and TIII, by specifying the connecting status from the HMI 202.

The correspondence table TII shows correspondence between
25 the hard address (H.ADR) and the management point (P.ADR) of the existing terminal equipment and a flag (FLG) showing whether or not the management point is used. The table TIII shows the

correspondence between the hard address (H. ADR) of the new terminal equipment and the management point (P. ADR) and a flag (FLAG) that shows whether or not the management point is used.

Fig. 3 is an explanatory diagram showing one example of processes performed by the processors (PS) 200 and 200A and the HMI 202 when the status is changed.

The HMI 202 maintains the address correspondence table TI shown in Fig. 2. The address correspondence table TI shows point information including hard addresses for the existing and new terminal equipments, addresses of management points to be managed, and an indication showing the management points are connected to either the existing or new terminal equipment.

The table TI is expanded to the correspondence tables TII and TIII for each hard address in each processor (PS) 200 and 200A, and is down loaded to each processor on an initial process.

The processor (PS) 200 (200A) holds the address correspondence table TII (TIII), which is downloaded from the HMI 202 as point information. The point information is expanded to a scanning memory 211, which stores the current status in each point and an address conversion table 212 on the initial process.

The address conversion table 212 is formed as described above, and is composed of a hard address, a point address corresponding to the hard address, and a flag (FLAG) showing whether the hard address is valid or not.

The FLAG has a configuration as reflected by change of the status (STATUS) showing whether the existing terminal

equipment 101 or the new terminal equipment 101A is available in the HMI 202.

Fig. 4 is an operational flow chart of the processor (PS) 200, 200A shown in the process explanatory diagram of Fig. 3.

5 When it is informed from the terminal equipment 101 that the status is changed, the processor (PS) 200 collects the terminal information (STEP S011). The processor 200 obtains the changed status from the terminal information (STEP S012). Next, the processor 200 reads the FLAG information of the address conversion table 212 (STEP S013). Then, the processor 10 200 judges whether or not the FLAG information is valid (STEP S014).

 If the FLAG information is valid, the address corresponding to the generated status change is converted according to the address conversion table 212. (STEP S015). Then, the contents 15 of the status changed are expanded to the scanning memory 211 (STEP S016), and the changed status is informed to the HMI 202, which is an upper level device (STEP S017).

 As shown in Fig. 3, the HMI 202 receives the information 20 of the changed status (STEP S018), performs a screen displaying process of the status changed in the point corresponding to the hard address to be managed (STEP S019), and displays that on the CRT display device 204.

Advantages in the embodiment are:

25 First is that there is no need to prepare a HMI for switching when switching from the existing terminal equipment to the new terminal equipment, and there is further no need to use plural

HMIIs properly during the switching period; and

Second is that there is no need to have two sets of management point data for the existing and new terminal equipment. Those advantages bring merits as follows:

5 First is that there is no need to have capacity of the twice capacity of the point to be managed.

Second is that there is no need to register and change the address, which is registered as the display data and the functional data, because the point address is not changed, even
10 if the management point is switched from the existing terminal equipment to the new terminal equipment.

Fig. 5 shows the second embodiment according to the present invention. A terminal status management table TIV and a terminal correspondence table TV are provided to the HMI 202.
15 The table TIV includes distinguishes between the existing and new terminal equipment, the corresponding terminal address and the FLAG information showing whether or not the terminal equipment is available.

The terminal correspondence table TV includes information
20 of the correspondence between addresses of the existing and new terminal equipment. The terminal status management table TIV specifies available or unavailable for each existing and new terminal equipment by the FLAG.

In here, new terminal equipment has a different structure
25 from the existing terminal equipment, and therefore, the terminal number RA is not always corresponding by identical between the existing and new terminal equipment. Accordingly,

it is determined by the updated rule table TVI set in advance, which terminal number RA is made available when both FLAGS are valid or invalid for the existing terminal equipment and the new terminal equipment.

5 In other words, updated rule in the updated rule table TVI are searched with reference to the terminal status management table TIV and the terminal correspondence table TV (STEP S020), and the status of the HMI address correspondence table TI of the management point corresponding to the terminal equipment
10 is automatically updated (STEP S021).

 In this way, the information is expanded to the existing processor (PS) address correspondence table TII and the new processor (PS) address correspondence table TIII according to the updated HMI address correspondence table TI, and then, the
15 processes after that are performed, similarly to those of the first embodiment shown in Figs. 2 to 4.

 Fig. 7 shows the third embodiment according to the present invention. In the third embodiment, the processor (PS) 200, which manages the point to be managed or the address conversion
20 device in the fourth embodiment, which is described later, judges which the existing terminal equipment 101 or the new terminal equipment 101A is used. The hard address corresponding to the point to be managed is automatically switched according to the status.

25 Fig. 8 shows relationship between the HMI 202 and the processor (PS) 200 (200A) for explaining the operation of the third embodiment. Further, Fig. 9 is a diagram showing a

diagram status transition of the existing and new terminal equipment. Fig. 10 is an operational flow chart corresponding to Fig. 9.

5 The HMI 202 has a terminal correspondence table TV, similarly to those of the first and second embodiments, and the table TV defines the correspondence between addresses of the existing and new terminal equipment.

10 The HMI 202 further includes a terminal status management table TIV, to which the terminal status informed from the processor (PS) 202 is reflected.

15 The terminal status management table TIV in the example of Fig. 7 includes an indication of the terminal status corresponding to the terminal address that shows LIVE or DEAD status, a flag FLAG showing valid or not, and an operational MODE indication showing NORMAL or TEST mode on the valid FLAG and NULL on the invalid FLAG.

20 The terminal status management table TIV in which the terminal status is reflected and the terminal correspondence table TV are searched in each predetermined period according to the used terminal judging process by the HMI 202.

In other words, the HMI 202 receives the information sent from the processor 200 (220A) and collects the terminal status (STEPP S030) in the operational flow chart shown in Fig. 10. Then, the used terminal judging process is performed by the HMI 202 (STEP S031).

In Fig. 10, it is judged whether the existing terminal is in a DEAD status or not during the used terminal judging process

(STEP S031). When the existing terminal equipment is in the DEAD status, it is judged whether or not the new terminal equipment is in a LIVE status (STEP S131).

5 The status that new terminal equipment is in the LIVE status on the step S131 corresponds to a broken line of Fig. 9. In this case, the HMI 202 waits for a certain period as a monitor time (STEP S132).

10 After the monitor period is elapsed, it is judged whether or not the new terminal equipment is in the LIVE status (STEP S133). If it is judged the new terminal equipment is in the LIVE status, the used terminal judging process (STEP S031) is finished, and then, updating process of the status of the HMI address table TI (STATUS) and the operating mode is performed (STEP S032).

15 The STATUS flag of the management point of the relevant terminal equipment of the address correspondence table TI is updated according to the updating process of the step S032. In addition, the updated STATUS flag of the HMI address correspondence table TI is downloaded to the processor 200 (200A) (STEP S033).

20 Then, the processor 200 (or 200A) expands the processor address correspondence tables TII and TIII according to the tables TI and TII for HMI address, and then, the flag FLAG is updated in each processor (PS) address correspondence table (STEP S034).

The available terminal equipment is switched to the new terminal equipment according to the FLAG updating process on

the table for the processor (PS) address. Since an operation test is required before the operation after switching of the terminal equipment, the operation mode is included, as shown in Fig. 9, which is changed to a TEST mode where the point can be monitored and controlled after the switching, but monitoring and controlling by the application process can not be possible. After an elapse of the TEST mode, the mode is switched to the NORMAL mode, and then, the new terminal equipment becomes actually operable.

10 The operation mode of the terminal, of which status on the HMI address correspondence table TI of Fig. 7 is "NEW", is set to the TEST mode, for example. The transition from the TEST mode to a NORMAL mode that means a normal operational mode can be performed by a manual operation.

15 The third embodiment brings a merit as follows:

It is possible to automatically transit to a test mode without any instruction of switching in each point after the existing terminal equipment is switched to the new terminal equipment, and it is also possible to transit from the test mode in total, thus it becomes possible to reduce times of transiting to the operation after the terminal equipment is switched and replacing the system.

20 Fig. 11 shows a structural diagram of a fourth embodiment according to the present invention, and the embodiment realizes each operation of the above-described embodiments by an address conversion device 213.

In other words, the address conversion device 213 is formed

with an address conversion function of the existing processor 200 commonly for the existing and new terminal equipments 101 and 101A, instead of providing a new processor 200A.

Therefore, interface circuits 203 and 203A corresponding
5 to the existing and new terminal equipment 101 and 101A are provided to one address conversion device 213 in Fig. 11. Other structure and operation are the same as those of the first to third embodiments, which are described above.

As is explained according to the attached drawings, there
10 is no need to prepare two systems, there is also no need to operate in two systems during a switching period, and it becomes possible to effectively replace without temporally providing apparatuses and without interfering with the operation.

Additionally, since there is no need to prepare data for
15 existing and new terminal equipments in double, effective replacement can be performed. Further, it becomes possible to accurately operate a new system without changing before switching the system because the management point address is not changed, without any interference on the operation.

20 The invention may be embodied in other specific forms without departing from the spirit or essential characteristics thereof. The present embodiment is therefore to be considered in all aspects as illustrative and not restrictive, the scope of the invention being indicated by the appended claims rather
25 than by the foregoing description and all changes which come within the meaning and range of equivalency of the claims are therefore intended to be embraced therein.

What is claimed is:

1. A method for controlling replacement of plural terminal
equipment in a building management system, connected to plural
5 points to be managed in a building, comprising the steps of:

tabulating a connecting status showing which existing
terminal equipment or new terminal equipment is used in each
point to be managed and correspondence between hard addresses
of the existing terminal equipment and new terminal equipment,

10 and

switching hard addresses corresponding to the points to
be managed from the tabled connecting status of the terminal
equipment and the correspondence between the hard addresses
of the existing terminal equipment and the new terminal
15 equipment.

2. The method according to claim 1,

wherein the step of tabulating includes the steps of
tabulating connecting status of the terminal equipment to be
20 managed in each terminal equipment, specifying which existing
or new terminal equipment is used in each terminal equipment
and generating connecting status of the terminal equipment
according to the specification.

25 3. The method according to claim 1,

wherein the connecting status of the terminal equipment
is expressed by a flag to be set when the connecting status

is tabulated.

4. The method according to claim 2,

wherein the connecting status of the terminal equipment
5 is expressed by a flag to be set when the connecting status
is tabulated.

5. The method according to claim 3,

wherein in the step of switching the hard addresses when
10 the existing terminal equipment is switched to the new terminal
equipment according to a judgement of the connecting status
of the terminal equipment when switching the hard address
corresponding to the point to be managed, the point to be managed
is only monitored and controlled, of which mode is changed to
15 a TEST mode where the point can not be monitored and controlled
by application processes.

6. The method according to claim 5,

wherein the TEST mode is transited to a normal operation
20 mode by a manual operation

7. A system for controlling a replacement of terminal
equipment connected to plural points to be managed in a building,
comprising:

25 a center device having a table for a connecting status
showing which existing terminal equipment or new terminal
equipment is used in each point to be managed and correspondence

between hard addresses of the existing terminal equipment and the new terminal equipment, which are corresponding to the points to be managed, and

existing terminal equipment or a new terminal equipment,
5 which is connected to the center device,

wherein the hard address corresponding to the point to be managed is switched according to the connecting status of the terminal equipment and the correspondence between hard addresses of the existing terminal equipment and the new
10 terminal equipment obtained from the table of the center device, and a connection from the existing terminal equipment or the new terminal equipment to the center device is controlled.

8. The method according to claim 7,

15 wherein the center device includes a human-machine interface section and a processor, to which the existing or new terminal equipment is connected,

the human-machine interface section includes a table for managing the connecting status of terminal equipment in each
20 terminal equipment and specifies a status which the existing terminal equipment or the new terminal equipment is used in each terminal equipment, and

the processor generates the connecting status of terminal equipment in each management point according to the
25 specification.

9. The system according to claim 7,

wherein the connecting status of the terminal equipment is expressed by flags to be set when the connecting status is tabulated.

5 10. The system according to claim 8,

wherein the connecting status of the terminal equipment is expressed by flags to be set when the connecting status is tabulated.

10 11. The system according to claim 9,

wherein when the processor switches the existing terminal equipment to the new terminal equipment according to a judgement of the connecting status of the terminal equipment when switching the hard address corresponding to the points to be managed, the points to be managed are only monitored and controlled, of which mode is changed to a TEST mode where the points can not be monitored and controlled by application processes.

20 12. The system according to claim 11,

wherein the TEST mode to a normal operation mode is executed by a manual operation.

25

ABSTRACT

A method for controlling replacement of plural terminal equipment in a building management system is disclosed, in which
5 a system can be effectively replaced, without providing any temporal apparatuses and without any obstacle on the operation.

The method for controlling replacement of plural terminal equipment connected to plural points to be managed in a building, includes the steps of tabulating a connecting status showing

10 which existing terminal equipment or new terminal equipment is used in each point to be managed and correspondence between hard addresses of the existing terminal equipment and the new terminal equipment, which correspond to the points to be managed, and switching hard addresses corresponding to the points to
15 be managed according to the tabled connecting status of the terminal equipment and the correspondence between the hard addresses of the existing terminal equipment and the new terminal equipment.

FIG. 1

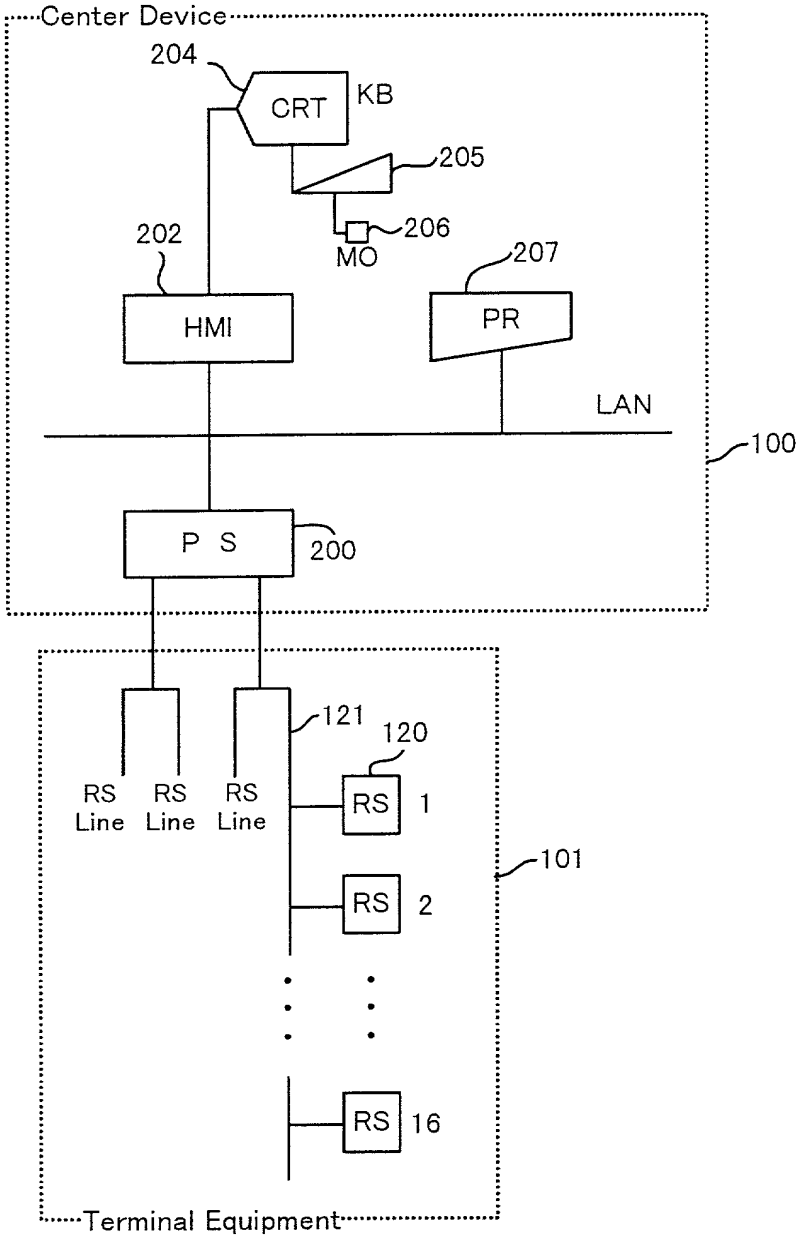
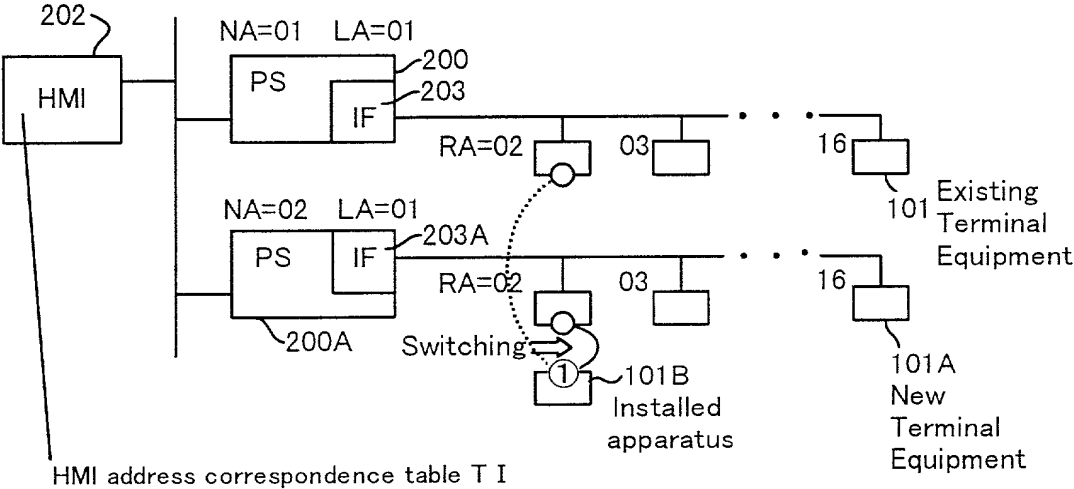


FIG. 2



P. ADR	H. ADR(OLD)	H. ADR(NEW)	STATUS
0000000001	0101020101	0201020101	<u>NEW</u>
0000000002	0101020102	0201020102	<u>OLD</u>
:	:	:	

Expanding

PS(NA=01) Address correspondence table T II

H. ADR	P. ADR	FLAG
0101020101	0000000001	<u>Used</u>
0101020102	0000000002	<u>Not Used</u>
:	:	

PS(NA=02) Address correspondence table T III

H. ADR	P. ADR	FLAG
0201020101	0000000001	<u>Not Used</u>
0201020102	0000000002	<u>Used</u>
:	:	

FIG. 3

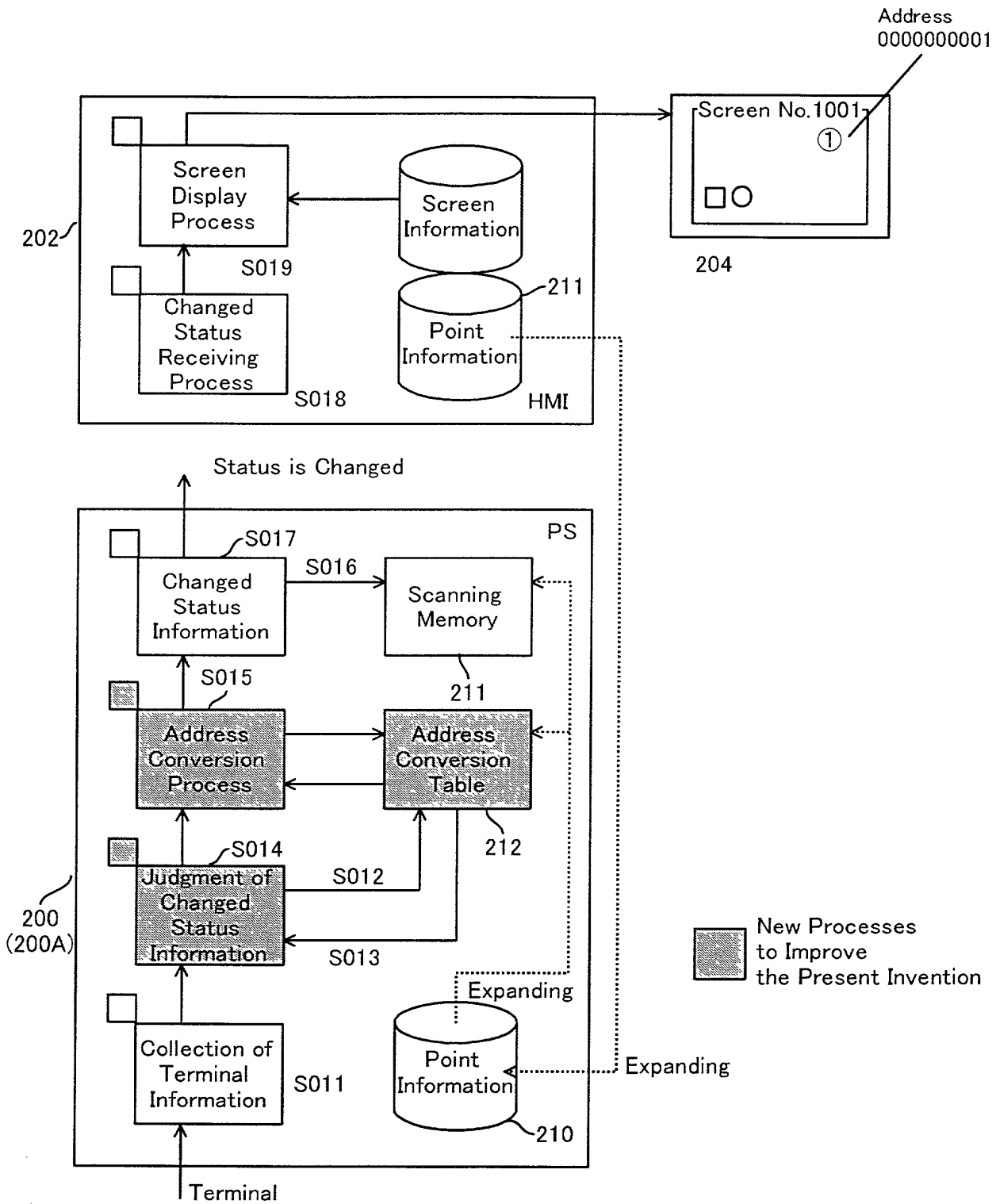


FIG. 4

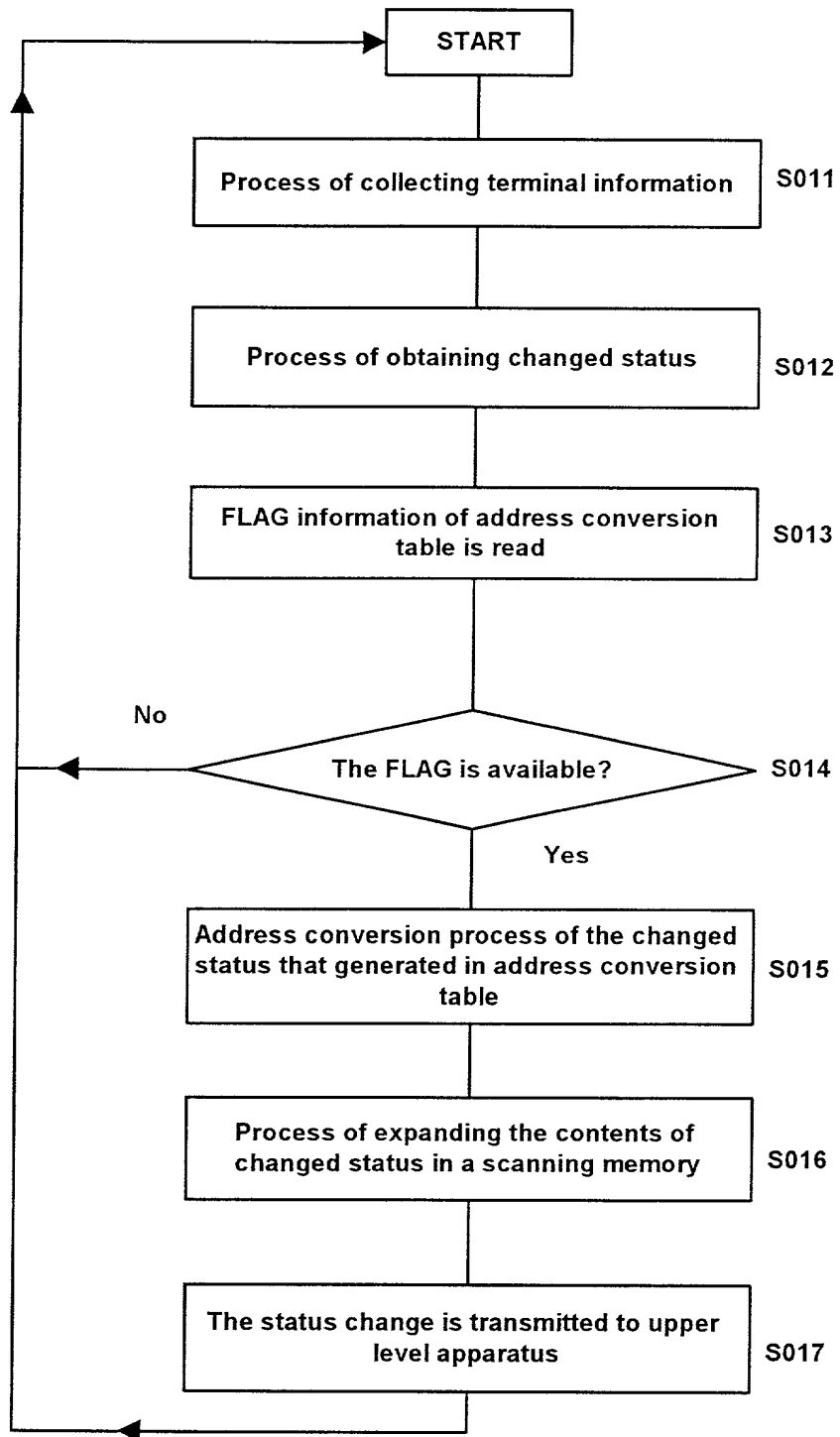


FIG. 5

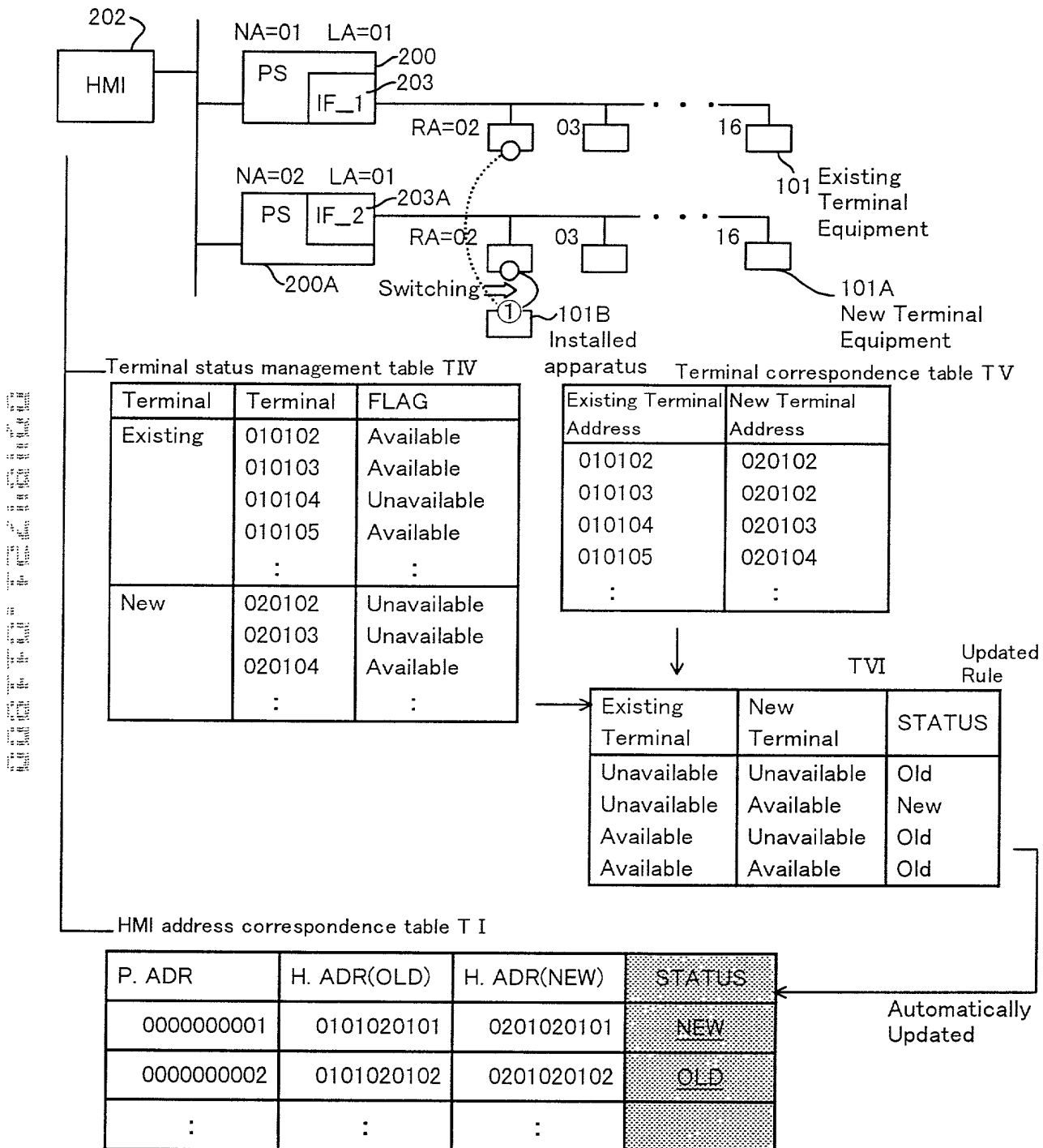


FIG. 6

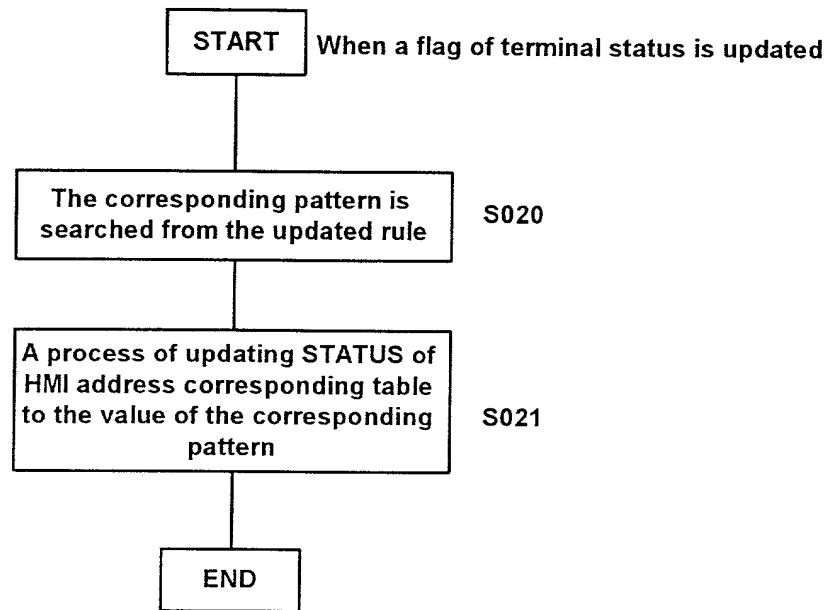
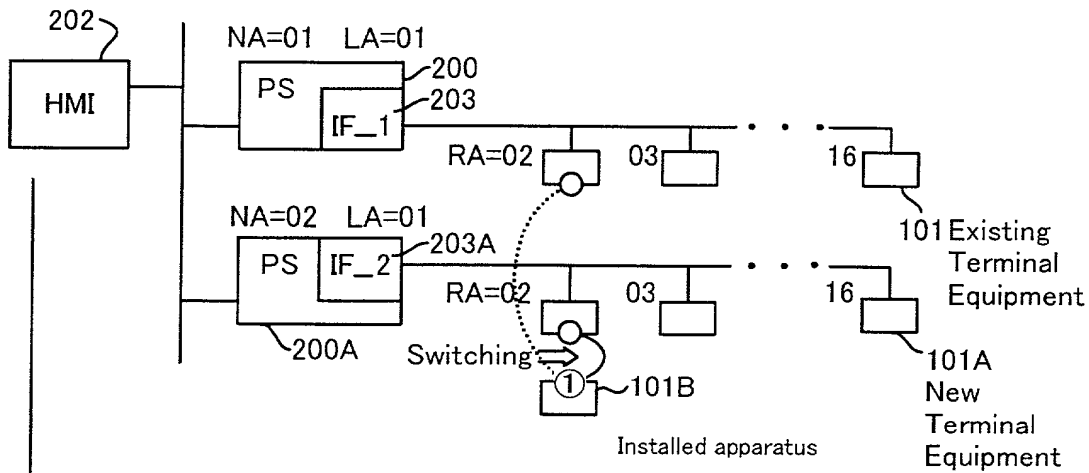


FIG. 7



Terminal correspondence table T V

Existing Terminal Address	New Terminal Address
010102	020102
010103	020102
010104	020103
010105	020104
:	:

Terminal status management table T IV

Terminal Address	Status	FLAG	MODE
010102	Live	Available	Normal
010103	Live	Available	Normal
010104	Dead	Unavailable	Null
010105	Live	Available	Normal
:	:	:	:
020102	Live	Unavailable	Null
020103	Live	Unavailable	Null
020104	Dead	Available	Test
:	:	:	:

HMI Address correspondence table T I

P. ADR	H. ADR(OLD)	H. ADR(NEW)	STATUS	Operation Mode
0000000001	0101020101	0201020101	NEW	TEST
0000000002	0101020102	0201020102	OLD	NORMAL
:	:	:	:	:

Expanding

PS(NA=01) address correspondence table T II

H. ADR	P. ADR	FLAG
0101020101	0000000001	Used
0101020102	0000000002	Not Used
:	:	:

PS(NA=02) address correspondence table T III

H. ADR	P. ADR	FLAG	Operation Mode
0201020101	0000000001	Not Used	TEST
0201020102	0000000002	Used	NORMAL
:	:	:	:

FIG. 8

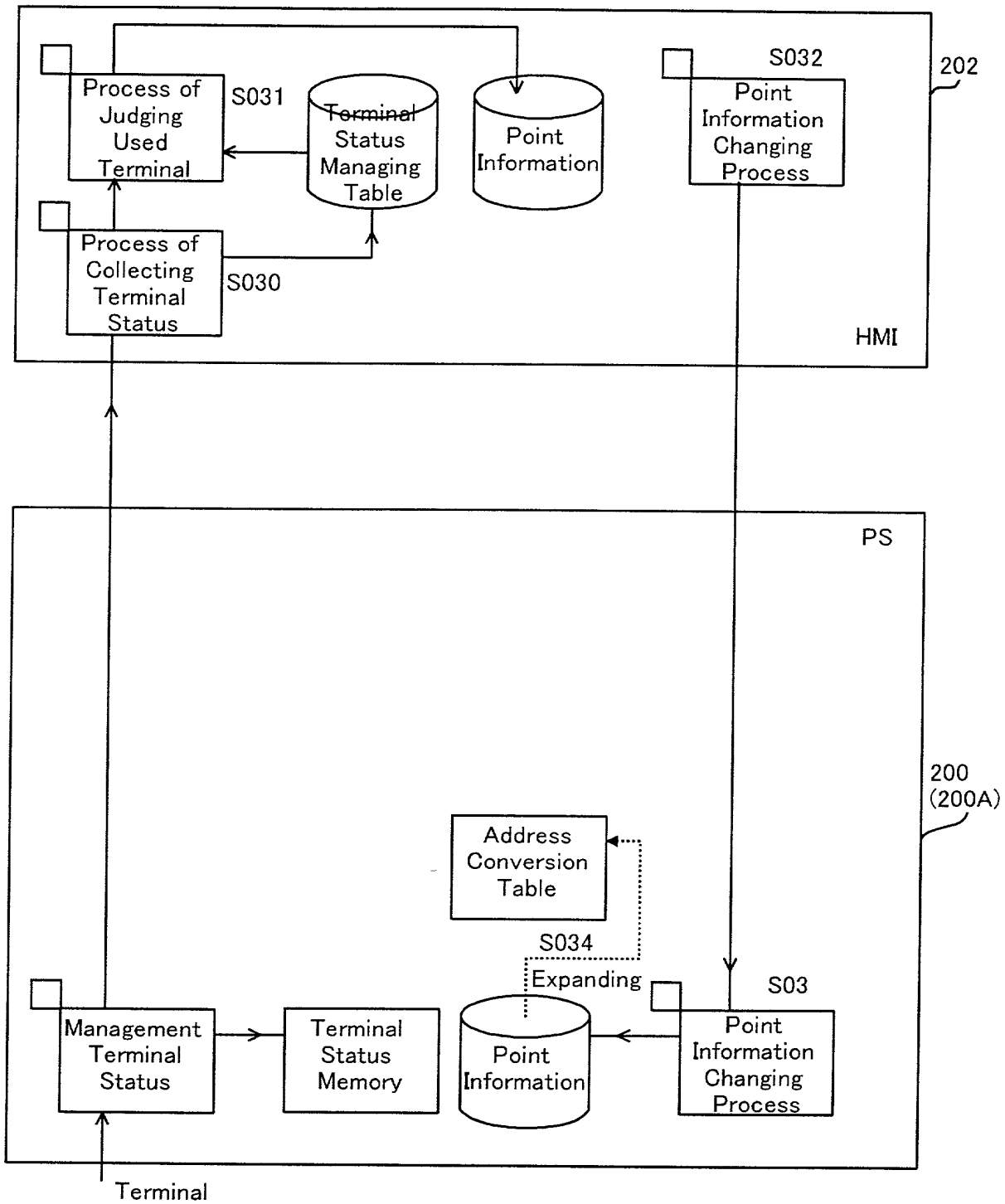
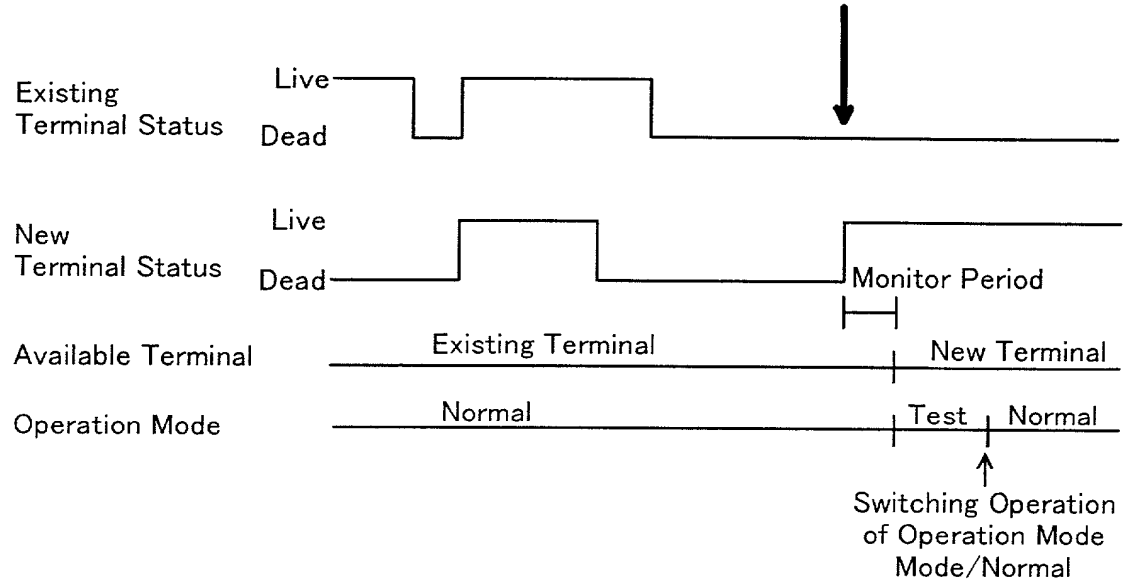


FIG. 9



	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050	2051	2052	2053	2054	2055	2056	2057	2058	2059	2060	2061	2062	2063	2064	2065	2066	2067	2068	2069	2070	2071	2072	2073	2074	2075	2076	2077	2078	2079	2080	2081	2082	2083	2084	2085	2086	2087	2088	2089	2090	2091	2092	2093	2094	2095	2096	2097	2098	2099	2100	2101	2102	2103	2104	2105	2106	2107	2108	2109	2110	2111	2112	2113	2114	2115	2116	2117	2118	2119	2120	2121	2122	2123	2124	2125	2126	2127	2128	2129	2130	2131	2132	2133	2134	2135	2136	2137	2138	2139	2140	2141	2142	2143	2144	2145	2146	2147	2148	2149	2150	2151	2152	2153	2154	2155	2156	2157	2158	2159	2160	2161	2162	2163	2164	2165	2166	2167	2168	2169	2170	2171	2172	2173	2174	2175	2176	2177	2178	2179	2180	2181	2182	2183	2184	2185	2186	2187	2188	2189	2190	2191	2192	2193	2194	2195	2196	2197	2198	2199	2200	2201	2202	2203	2204	2205	2206	2207	2208	2209	2210	2211	2212	2213	2214	2215	2216	2217	2218	2219	2220	2221	2222	2223	2224	2225	2226	2227	2228	2229	2230	2231	2232	2233	2234	2235	2236	2237	2238	2239	2240	2241	2242	2243	2244	2245	2246	2247	2248	2249	2250	2251	2252	2253	2254	2255	2256	2257	2258	2259	2260	2261	2262	2263	2264	2265	2266	2267	2268	2269	2270	2271	2272	2273	2274	2275	2276	2277	2278	2279	2280	2281	2282	2283	2284	2285	2286	2287	2288	2289	2290	2291	2292	2293	2294	2295	2296	2297	2298	2299	2300	2301	2302	2303	2304	2305	2306	2307	2308	2309	2310	2311	2312	2313	2314	2315	2316	2317	2318	2319	2320	2321	2322	2323	2324	2325	2326	2327	2328	2329	2330	2331	2332	2333	2334	2335	2336	2337	2338	2339	2340	2341	2342	2343	2344	2345	2346	2347	2348	2349	2350	2351	2352	2353	2354	2355	2356	2357	2358	2359	2360	2361	2362	2363	2364	2365	2366	2367	2368	2369	2370	2371	2372	2373	2374	2375	2376	2377	2378	2379	2380	2381	2382	2383	2384	2385	2386	2387	2388	2389	2390	2391	2392	2393	2394	2395	2396	2397	2398	2399	2400	2401	2402	2403	2404	2405	2406	2407	2408	2409	2410	2411	2412	2413	2414	2415	2416	2417	2418	2419	2420	2421	2422	2
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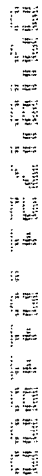


FIG. 11

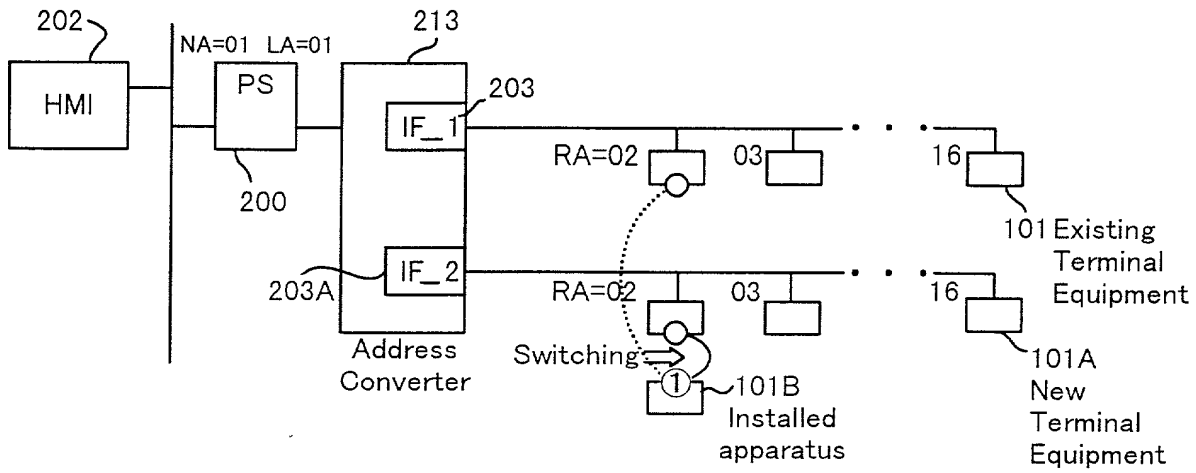


FIG. 12

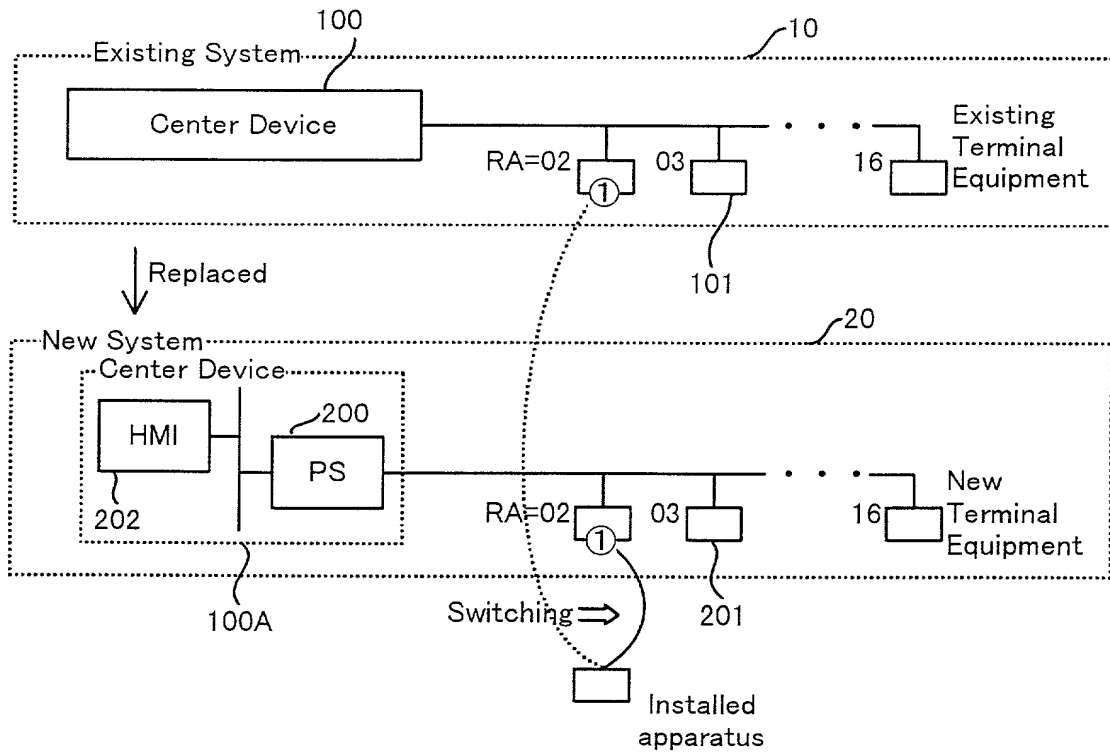


FIG. 13

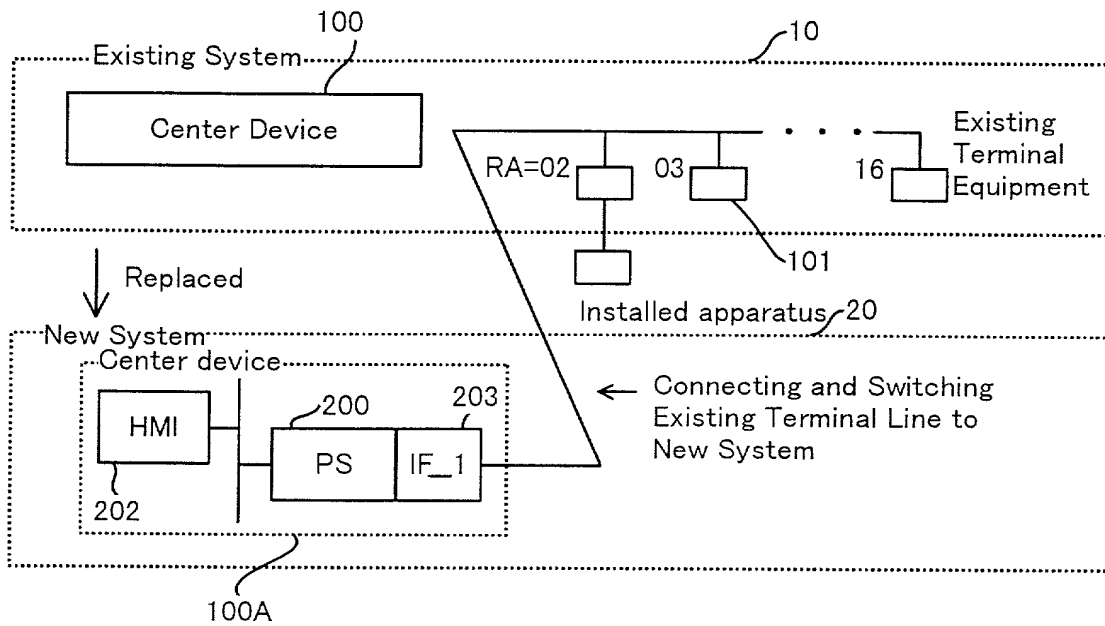


FIG. 14

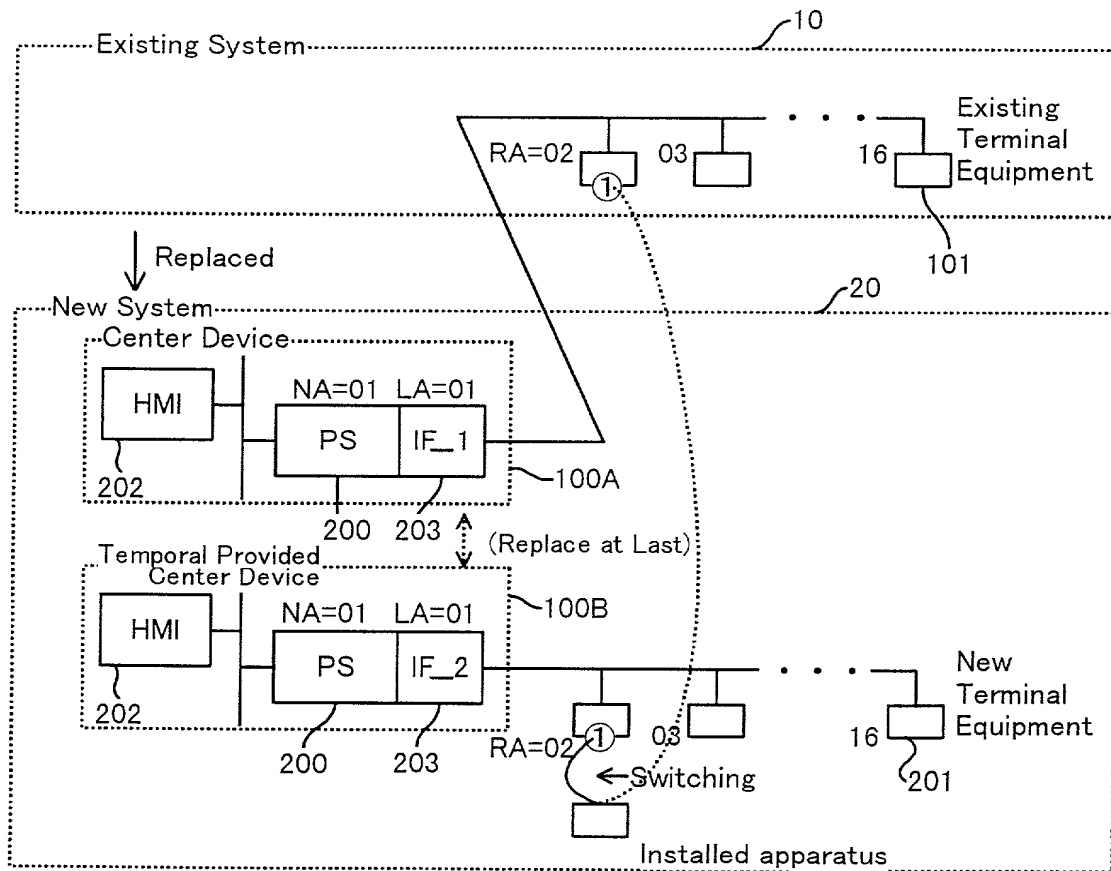


FIG. 15

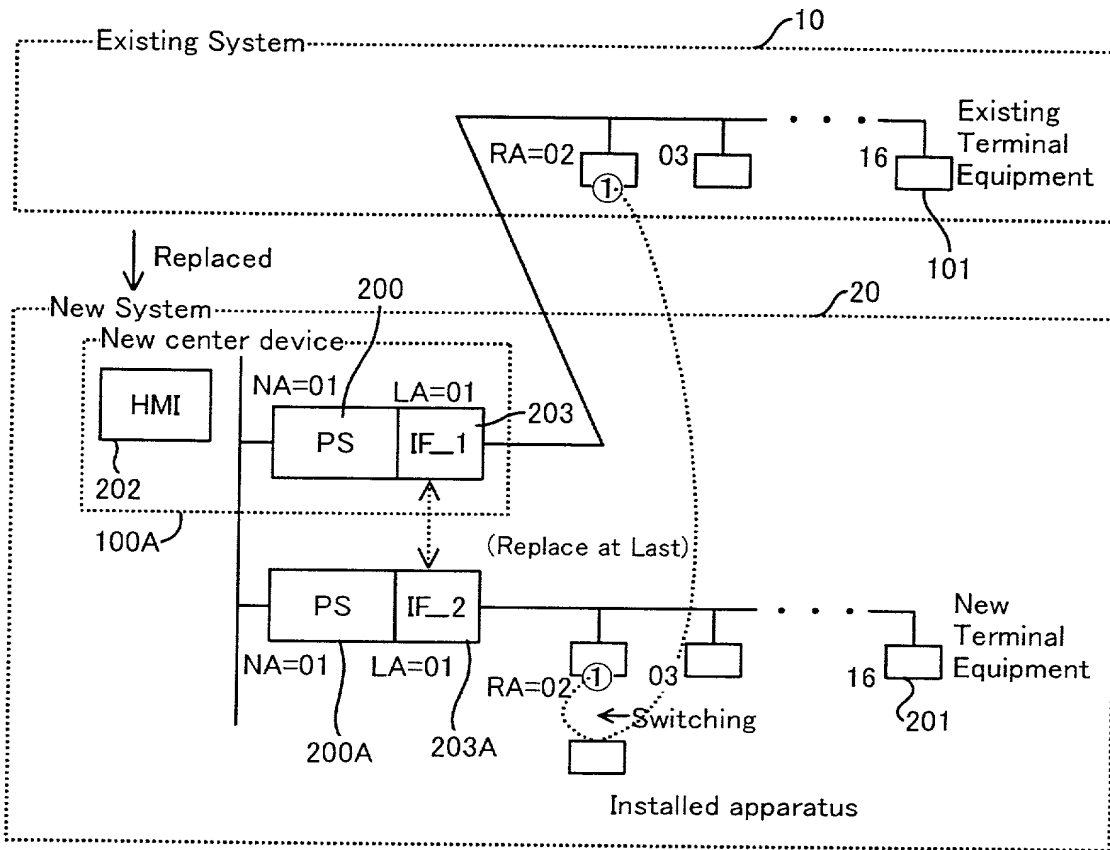


FIG. 16

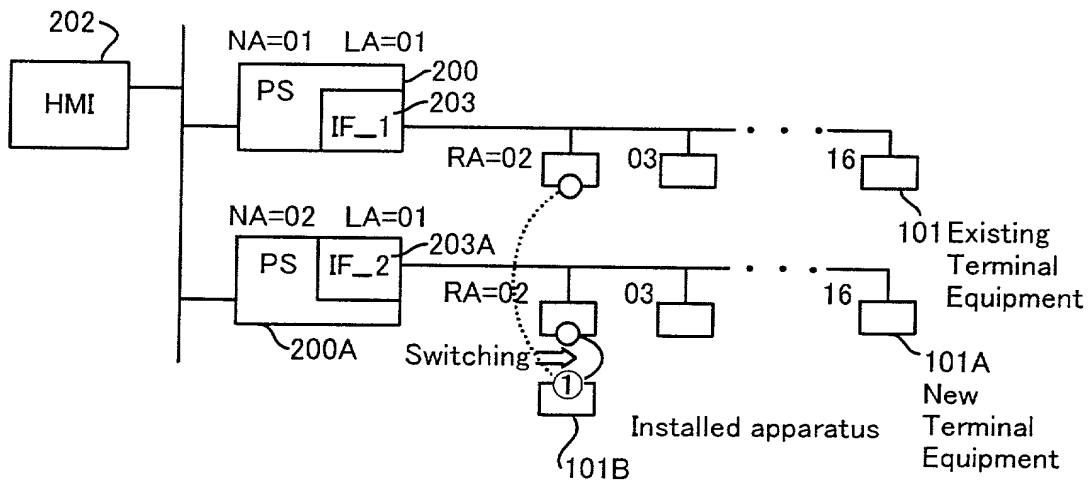


FIG. 17A

① Installed apparatus	Address When Connecting to Existing Terminal Equipment	NA	LA	RA	PA
	Address When Connecting to New Terminal Equipment	01	01	02	0101
		02	01	02	0101

NA=Processor No., LA=Interface No. in Processor, RA=Terminal Equipment No., PA=Destination No. of Connecting in Terminal Equipment No.

FIG. 17B

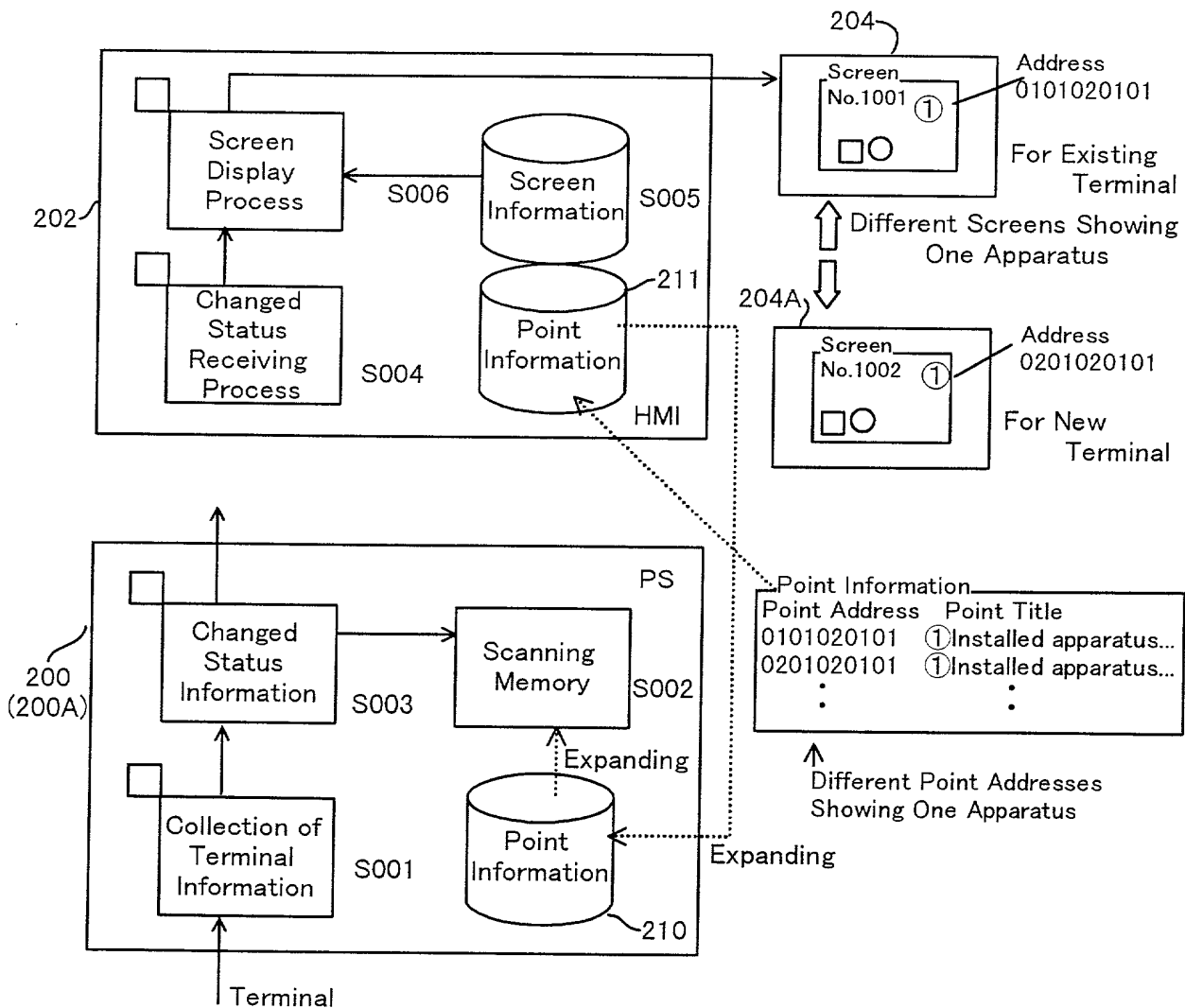
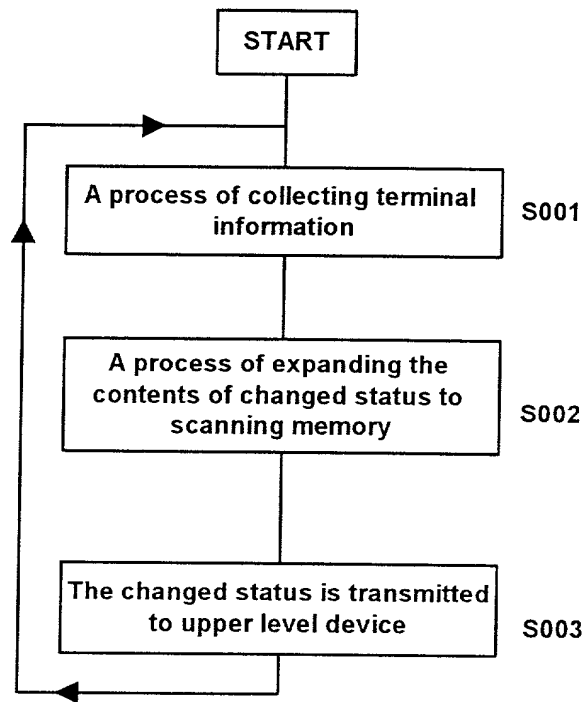


FIG. 18



Declaration and Power of Attorney For Patent Application**特許出願宣言書及び委任状****Japanese Language Declaration****日本語宣言書**

下記の氏名の発明者として、私は以下の通り宣言します。

As a below named inventor, I hereby declare that:

私の住所、私書箱、国籍は下記の私の氏名の後に記載された通りです。

My residence, post office address and citizenship are as stated next to my name.

下記の名称の発明に関して請求範囲に記載され、特許出願している発明内容について、私が最初かつ唯一の発明者（下記の氏名が一つの場合）もしくは最初かつ共同発明者であると（下記の名称が複数の場合）信じています。

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled

METHOD AND SYSTEM OF CONTROLLING REPLACEMENT

OF TERMINAL EQUIPMENT IN A BUILDING MANAGEMENT
SYSTEM

上記発明の明細書（下記の欄でx印がついていない場合は、本書に添付）は、

the specification of which is attached hereto unless the following box is checked:

☐ 月 日に提出され、米国出願番号または特許協定条約国際出願番号を _____ とし、
(該当する場合) _____ に訂正されました。

☐ was filed on _____
as United States Application Number or
PCT International Application Number
_____ and was amended on
_____ (if applicable).

私は、特許請求範囲を含む上記訂正後の明細書を検討し、内容を理解していることをここに表明します。

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims, as amended by any amendment referred to above.

私は、連邦規則法典第37編第1条56項に定義されるとおり、特許資格の有無について重要な情報を開示する義務があることを認めます。

I acknowledge the duty to disclose information which is material to patentability as defined in Title 37, Code of Federal Regulations, Section 1.56.

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

Japanese Language Declaration (日本語宣言書)

私は、米国法典第35編119条(a)-(d)項又は365条(b)項に基づき下記の、米国外の国の少なくとも一カ国を指定している特許協力条約365(a)項に基づく国際出願、又は外国での特許出願もしくは発明者証の出願についての外国優先権をここに主張するとともに、優先権を主張している、本出願の前に出願された特許または発明者証の外国出願を以下に、枠内をマークすることで、示しています。

Prior Foreign Application(s)

外国での先行出願

11-10414

Japan

(Number)
(番号)

(Country)
(国名)

(Number)
(番号)

(Country)
(国名)

私は、第35編米国法典119条(e)項に基づいて下記の米国外特許出願規定に記載された権利をここに主張いたします。

(Application No.)
(出願番号)

(Filing Date)
(出願日)

私は、下記の米国法典第35編120条に基づいて下記の米国外特許出願に記載された権利、又は米国を指定している特許協力条約365条(c)に基づき権利をここに主張します。また、本出願の各請求範囲の内容が米国法典第35編112条第1項又は特許協力条約で規定された方法で先行する米国外特許出願に開示されていない限り、その先行米国外出願書提出日以降で本出願書の日本国内または特許協力条約国際提出日までの期間中に入手された、連邦規則法典第37編1条56項で定義された特許資格の有無に関する重要な情報について開示義務があることを認識しています。

(Application No.)
(出願番号)

(Filing Date)
(出願日)

(Application No.)
(出願番号)

(Filing Date)
(出願日)

私は、私自身の知識に基づいて本宣言書中で私が行なう表明が真実であり、かつ私の入手した情報と私の信じていることに基づき表明が全て真実であると信じていること、さらに故意になされた虚偽の表明及びそれと同等の行為は米国法典第18編第1001条に基づき、罰金または拘禁、もしくはその両方により処罰されること、そしてそのような故意による虚偽の声明を行なえば、出願した、又は既に許可された特許の有効性が失われることを認識し、よってここに上記のごとく宣誓を致します。

I hereby claim foreign priority under Title 35, United States Code, Section 119 (a)-(d) or 365(b) of any foreign application(s) for patent or inventor's certificate, or 365(a) of any PCT International application which designated at least one country other than the United States, listed below and have also identified below, by checking the box, any foreign application for patent or inventor's certificate, or PCT International application having a filing date before that of the application on which priority is claimed.

Priority Not Claimed

優先権主張なし

19/01/1999

(Day/Month/Year Filed)
(出願年月日)

☐

(Day/Month/Year Filed)
(出願年月日)

☐

I hereby claim the benefit under Title 35, United States Code, Section 119(e) of any United States provisional application(s) listed below.

(Application No.)
(出願番号)

(Filing Date)
(出願日)

I hereby claim the benefit under Title 35, United States Code, Section 120 of any United States application(s), or 365(c) of any PCT International application designating the United States, listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States or PCT International application in the manner provided by the first paragraph of Title 35, United States Code Section 112, I acknowledge the duty to disclose information which is material to patentability as defined in Title 37, Code of Federal Regulations, Section 1.56 which became available between the filing date of the prior application and the national or PCT International filing date of application.

(Status: Patented, Pending, Abandoned)
(現況: 特許許可済、係属中、放棄済)

(Status: Patented, Pending, Abandoned)
(現況: 特許許可済、係属中、放棄済)

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

Japanese Language Declaration (日本語宣言書)

委任状: 私は下記の発明者として、本出願に関する一切の手続きを米特許商標局に対して遂行する弁理士または代理人として、下記の者を指名いたします。(弁護士、または代理人の氏名及び登録番号を明記のこと)

POWER OF ATTORNEY: As a named inventor, I hereby appoint the following attorney(s) and/or agent(s) to prosecute this application and transact all business in the Patent and Trademark Office connected therewith (list name and registration number)

書類送付先

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Helfgott & Karas, P.C.
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唯一または第一発明者名	Full name of sole or first inventor Kozo YOKOYAMA		
発明者の署名	日付	Inventor's signature	Date
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住所	Residence Nakahara-ku, Kawasaki-shi, Japan		
国籍	Citizenship Japan		
私書箱	Post Office Address c/o FUJITSU LIMITED, 1-1, Kamikodanaka 4-chome, Nakahara-ku, Kawasaki-shi, Kanagawa, 211-8588 Japan		
第二共同発明者	Full name of second joint inventor, if any		
第二共同発明者	日付	Second inventor's signature	Date
住所	Residence		
国籍	Citizenship		
私書箱	Post Office Address		

(第三以降の共同発明者についても同様に記載し、署名をすること)

(Supply similar information and signature for third and subsequent joint inventors.)

THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re the Application of: **Kozo YOKOYAMA**

Filed: : **Concurrently herewith**

For : **METHOD AND SYSTEM OF CONTROLLING REPLACEMENT OF
TERMINAL EQUIPMENT IN A BUILDING MANAGEMENT SYSTEM**

Serial No.: **Concurrently herewith**

January 18, 2000

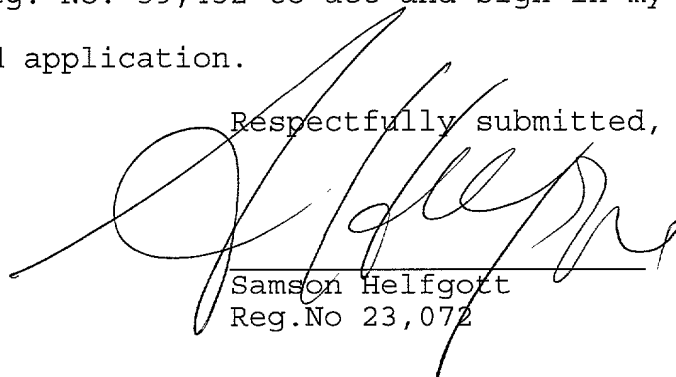
Assistant Commissioner of Patents
Washington, D.C. 20231

SUB-POWER OF ATTORNEY

S I R:

I, Samson Helfgott, Reg. No. 23,072 attorney of record
herein, do hereby grant a sub-power of attorney to Linda S.
Chan, Reg. No. 42,400, Jacqueline M. Steady, Reg. No., 44,354
and Harris A. Wolin, Reg. No. 39,432 to act and sign in my behalf
in the above-referenced application.

Respectfully submitted,



Samson Helfgott
Reg.No 23,072

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